B' cont'd the CMP slurry.

26. (Amended) A system for evaluating chemical mechanical planarization (CMP) slurry quality in a process, comprising:

a light source generating a beam of electromagnetic radiation for transmission through a flow of [the] ~~a~~ an undiluted optically dense slurry as used in a CMP process;

DB2

a spectral discriminator for isolating at least two wavelength bands of the radiation prior to transmission of the radiation through the flow;

a detector for detecting radiation transmitted through the flow; and

a processor for evaluating transmission of the wavelength bands through the flow to determine physical and/or chemical changes of the CMP slurry.

REMARKS

A terminal disclaimer and a Declaration of Todd A. Cerni (hereinafter, "the Declaration") are enclosed. Claims 1 and 26 have been amended to incorporate the definition of CMP in the claims, to clarify them.

The examiner has rejected claims 1 – 33 under the judicially created doctrine of obviousness-type double patenting over claims 1 - 50 of copending Application No. 09/069,682. While it is believed that the present claims are patentable over the claims in copending Application No. 09/069,682, a terminal disclaimer is enclosed to move this application quickly to issuance.

The examiner has rejected claims 1 – 4 and 17 under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 4,373,807 issued to Gerard Gouesbet (hereinafter, "Gouesbet"). This rejection is respectfully traversed. Gouesbet discloses that the apparatus described therein can be applied to measurements in furnaces, in flames, in combustion engines and at the outlet factory chimneys. See column 5, lines 46 – 51. There is no mention or suggestion in Gouesbet of transmitting light through a CMP slurry as claimed in claim 1. It is fundamental patent law that anticipation rejection under 35 U.S.C. 102(b) can only be made when everything in a claim is identically disclosed in a single reference. Thus, Gouesbet cannot anticipate claim 1. Claims 2 – 4 and 17 depend

on claim 1 and include all its limitations, and therefore are also patentable.

The examiner has rejected claims 1 and 11 under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,485,270 issued to Freud et al. (hereinafter, "Freud et al."). This rejection is respectfully traversed. Freud et al. discloses that the apparatus described therein can be applied to measurements of particles suspended in a liquid carrier that diffuses through a cell membrane. See column 1, lines 5 - 15. There is no mention or suggestion in Freud et al. of transmitting light through a CMP slurry as claimed in claim 1. It is fundamental patent law that anticipation rejection under 35 U.S.C. 102(b) can only be made when everything in a claim is identically disclosed in a single reference. Thus, Freud et al. cannot anticipate claim 1. Claim 11 depends on claim 1 and includes all its limitations, and therefore is also patentable.

The examiner has rejected claims 26, 29, 30, and 33 under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,422,712 issued to Shinichi Ogino (hereinafter, "Ogino"). This rejection is respectfully traversed. Ogino discloses that the apparatus described therein is used for analyzing liquids such as blood and urine. See column 1, lines 6 - 10. There is no mention or suggestion in Ogino of transmitting light through a CMP slurry as claimed in claim 26. It is fundamental patent law that anticipation rejection under 35 U.S.C. 102(b) can only be made when everything in a claim is identically disclosed in a single reference. Thus, Ogino cannot anticipate claim 26. Claims 29, 30, and 33 depend on claim 26 and include all its limitations, and therefore are also patentable.

Claims 5 – 16 and 18 – 25 were rejected under 35 U.S.C. 103(a) as being unpatentable over Gouesbet in view of "Commercial spectrophotometer for particle sizing" by Fabio Ferri et al., in Applied Optics Article No. XP 000685215 (hereinafter, "Ferri et al."), United States Patent No. 4,338,030 issued to Hendricus G. Loos (hereinafter, "Loos"), United States Patent No. 4,318,180) issued to Lundqvist et al. (hereinafter, "Lundqvist et al."), United States Patent No. 5,379,113 issued to Takeshi Niwa (hereinafter, "Niwa"), and "Analysis of particle sizes, concentration, and refractive index in measurement of light transmittance in the forward-scattering-angle range", by Anatoli P. Nefedov et al., in

Applied Optics Publication No. XP 00685510 (hereinafter, "Nefedov et al."). (Note that the examiner refers to this reference by the first name of the first author, i.e., "Anatoli"). This rejection is respectfully traversed.

As mentioned above, Gouesbet does not disclose transmission of light through a CMP slurry. Further, an essential feature of the Gouesbet disclosure is that the particles through which the light is passed exhibit Brownian motion. See column 3, lines 4 – 9. Ferri et al. discloses a spectrophotometer for measuring polystyrene particles suspended in water, and refers to various applications, such as atmospheric aerosols and combustion exhausts, all of which are transparent or nearly transparent mediums. See page 885, the abstract and the second sentence under the *Introduction*. Loos is applied to suspensions of particles in a gas or a liquid, such as water drops suspended in air, such as clouds and fogs. See column 1, lines 21 – 25 and 56 – 58. Lundqvist et al. states that the apparatus and process of its disclosure is used to measure fibers in fiber suspensions which are used as starting material for the manufacture of paper, which is in the geometric optics regime. CMP slurries consist of sub-micron particles, in the Mie optics regime. See the Declaration, paragraph 10. The measurement and analysis techniques are totally different in these two regimes. Niwa discloses that the system described is used for determining particle size distributions of powdery solids suspended in air. See column 1, lines 26 – 35 and lines 59 – 62. This again is an inherently transparent medium. Nefedov applies the disclosed apparatus to measuring the properties of polystyrene-latex particles suspended in distilled water. See, page 1363, the first paragraph under part 1B. It is specifically indicated that the particles are weak absorbing. See page 1365, the first paragraph under part 4.

Claims 5 – 16 and 18 – 25 all depend on claim 1 and contain the limitation that the radiation is transmitted through a CMP slurry. One skilled in the art would recognize that the mediums to which all of the above systems, and in particular, the Gouesbet system, are applied are transparent or nearly transparent mediums, and therefore would not think that it could be applied to an optically dense medium such as a CMP slurry. See the

specimen is present in the required concentration to make a valid measurement. See column 2, line 65 – column 3, line 43. The present claims teach the use of a reference to determine a size distribution in the flow, not to determine if a valid measurement has been made. One does not make the other obvious. Importantly, combining Niwa with Ogino would not result in the apparatus as claimed in claims 20 - 22. Therefore, these claims are patentable on this basis also.

With regard to claims 23 - 25, Nefedov et al. describes a scattering and absorption apparatus (see page 1357, the first sentence in part 1) while Gouesbet describes an apparatus that analyzes the beating of a diffused beam with itself. See column 3, lines 16 - 17. These are very different optical devices, and there is no reason to combine one with the other. Thus, claims 23 - 25 are patentable on this basis also.

Claims 27 - 28 and 31 - 32 were rejected under 35 U.S.C. 103(a) as being unpatentable over Ogino in view of Loos and Niwa. This rejection is respectfully traversed. As indicated above, Ogino discloses that the apparatus described therein is used for analyzing liquids such as blood and urine, Loos is applied to suspensions of particles in a gas or a liquid, such as water drops suspended in air, such as clouds and fogs, and Niwa discloses that the system described is used for determining particle size distributions of powdery solids suspended in air. Nothing in any of the references suggests that the apparatus and process disclosed can be applied to an optically dense medium such as a CMP slurry. Thus, claims 27 – 28 and 31 – 32, all of which depend on claim 26 and contain the limitation that the radiation is transmitted through a CMP slurry, are patentable.

With regard to claims 27 and 28, the gratings of Loos are used to separate components of the light after transmission and fluorescence (see FIG. 1 and the Abstract), while in the present application, they are used to separate the components of the light prior to transmission. One does not make the other obvious; thus, claims 27 and 28 are patentable on this basis also.

With respect to claims 31 - 32, Niwa teaches the use of a reference to judge if the specimen is present in the required concentration to make a valid measurement. See

Declaration, paragraphs 5 – 16. In fact, in view of the number of references that the examiner applies, none of which suggest that an optical measurement system can be used with an optically dense medium, such as a CMP slurry, makes a convincing case by itself that the invention as claimed is non-obvious.

With regard to claims 5 – 7, the examiner states that the present application states on page 28, lines 15 – 16, that the step of determining the slope of a logarithmic of transmission as a function of wavelength is known in the art. This is not correct. The application only says that one skilled in the art knows how to calculate slopes of curves. Of course, everyone with any technical background at all can calculate a slope given a figure such as FIG. 12A. This does not mean that incorporating such a calculation into a light transmission measurement process is known in the art. For this reason, claims 5 - 7 are not obvious over the cited art on this basis also.

With regard to claims 8 - 9 and 15, Ferri et al. describes an extinction apparatus (see page 886, the first sentences in parts 2 and 3) while Gouesbet describes an apparatus that analyzes the beating of a diffused beam with itself. See column 3, lines 16 - 17. These are very different optical devices, and there is no reason to combine one with the other. In addition, Gouesbet is also a single wavelength device that operates on monodispersions and there is no reason to derive from it that a multiple wavelength device can be effectively used to measure polydispersive materials such as CMP See the Declaration, paragraph 12. Thus, claims 8 and 9 are patentable on this basis also.

With regard to claims10 – 14, the examiner's statement that these claims are obvious because the Applicant "has not disclosed that having such a diameter would solve any specific problem or for any particular purpose" is not only wrong, it turns the patent law on its head. The patent law requires the examiner to find a reference that shows the disclosed claimed property. If the examiner cannot establish a prima facie case of obviousness, Applicant does not have to do anything more than disclose the device as claimed. Thus, claims 10 – 14 are patentable on this basis also.

With respect to claims 20 – 22, Niwa teaches the use of a reference to judge if the

column 2, line 65 – column 3, line 43. The present claims teach the use of a reference to determine a size distribution in the flow, not to determine if a valid measurement has been made. One does not make the other obvious. Importantly, combining Niwa with Ogino would not result in the apparatus as claimed in claims 31 and 32. Therefore, these claims are patentable on this basis also.

For the above reasons, claims 1 – 33 are patentable and their reconsideration and allowance are respectfully requested. A check in the amount of $220.00 is enclosed, in payment of the Terminal Disclaimer fee and the Petition For One-Month Extension Fee. However, if any additional fee is due, please charge it to the Deposit Account No. 04-1697.

Respectfully submitted,
DUFT, GRAZIANO & FOREST, P.C.

By: _____

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